**JOSEPH M. OKOH**
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# BIOGRAPHICAL SKETCH

Dr. Okoh is the Acting Chairman of the Department of Natural Sciences and has been the Director of the UMES MARC Program since 1994. Under his leadership in the last two years, four trainees have matriculated into doctoral programs nationwide, ranging from molecular biology to clinical nutrition. Apart from the MARC Program, Dr. Okoh is the PI and Co-PI, respectively, in two U.S. Department of Energy grants, totaling more than $600,000, having received the awards within the last two years.

Dr. Okoh received his Baccalaureate degree in chemistry with honors from Lagos University in Nigeria in 1974. The doctoral degree was earned in Inorganic Chemistry from Howard University in Washington, D.C. in 1982. His dissertation was titled: "Some Aspects of the Solution Chemistry of Silver I Porphyrins." Porphyrins are biomolecules.

Dr. Okoh continues efforts to secure funding from local, state and federal government agencies including private foundations, to strengthen the curricula for science majors in the department, promote faculty development and enhance the departmental research support infrastructure. He has also initiated effective liaison and contact with these agencies including: Federal Energy Technology Center, Pittsburgh, PA; Hewlett-Packard Company, Little Falls, DE; Uniformed Services University of the Health Sciences, Bethesda, MD; National Science Foundation (NSF), Arlington, VA; Center for CREST Coal Research, Iowa State University, Ames, IA; Institute of Environmental Sciences, Austin, TX; Delmarva Power and Light Company, Wilmington, DE; and the US-South African Education Partnership Consortium, Department of Commerce, Washington, D.C.

He has served as mentor and advisor to students enrolled in undergraduate research and at the graduate level (four Undergraduate students, six MS students, and six Ph.D. students) Dr. Okoh has been successful in securing more than $800,000 in funds for curriculum development and research. Recently (Summer, 1998), with a colleague, he acquired $400,000 to fund a state-of-the-art Water Quality Laboratory. Last year, with the assistance of several colleagues, he co-hosted the National Symposium on Energy Research (4/26-4/29) at Ocean City, MD with the Department of Energy. Dr. Okoh published three articles within the past year (1997-1998) including:

1) E. Loren Fuller, Jr. and Joseph M. Okoh, Kinetics and Mechanisms of the Reaction of Air with Nuclear Grade Graphite: IG110; Journal of Nuclear Materials, (240) 241-250, 1997.

2) Gian Gupta, J. Borowiec and J. Okoh; Toxicity Identification of Poultry Litter Aqueous Leachate, Poultry Science 76:1364-1367, 1997.

3 ) Joseph M. Okoh, Joseph N. Dodoo and Adria Diaz, "Beneficiation of Fly Ash by Carbon Burn Out"; Proceedings of the 22nd International Technical Conference on Coal Utilization and Fuel Systems-Clearwater, Florida, March 16-19, 1997.

He is also currently a member of the National Steering and Planning Committee for the 1999 NOAA (National Oceanic and Atmospheric Administration) National Conference scheduled for March 30 - 31, 1999 at the University of Maryland Eastern Shore.

# " EFFECTS OF FLY ASH ON MERCURY OXIDATION DURING POST COMBUSTION CONDITIONS"

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## ABSTRACT

Fundamental information on the role of fly ash on the oxidation of mercury (Hg) in the post-combustion zone at coal-fired boilers will be obtained. This will help predict mercury speciation in flue gas streams through an improved understanding of the role of the fly ash component on mercury chemistry. The effectiveness of Hg abatement technologies is highly dependent on the Hg species present, but it is not possible to predict Hg removal efficiencies for any of existing technologies since the chemistry affecting Hg speciation is poorly understood. Fly ash is an important flue gas component that acts as a catalyst in the oxidation of elemental Hg or otherwise attenuates the Hg stream. However, the mechanisms by which fly ash affects the distribution of Hg species are unknown. Therefore, a study of carbon oxidation reactions in subbituminous coal fly ash has been undertaken to evaluate residual-carbon-fly ash reaction chemistry.

Oxygen at different concentrations using custom mixed oxygen and nitrogen containing 5-15% oxygen was the reactive gas. Surface area measurements were conducted on a Micro meritics ASAP 2010. Data were collected for each kinetic run as a continuous record of the sample mass, temperature, and time with a PC interfaced to a CAHN Microbalance capable of temperatures up to 1100 C. Rates were determined for each oxidation reaction using initial rates. The dependence of reaction rates on temperature was evaluated by the Arrhenius Equation. Carbon content of fly ash was measured with a scanning electron microscope and confirmed by loss of ignition studies using the CAHN Thermal Analyzer. Reaction rates were found to be first order in oxygen with apparent activation energy of 6.62 kcal/ mole indicating catalytic activity. Surface area of fly ash varied from 5.5 m2/g for mesh size #100 (20% C) to 3.0028 m2/g for #325 (3.2% C). Average pore diameter for #325 and #200 was 115.